

ELECTROPOLLUTION, HORMONES AND CANCER

Electromagnetic radiation from cellphones, towers and electrical appliances as well as new wireless technologies stresses our health by disrupting hormonal action and physical processes, in some cases triggering cancer.

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More than a decade ago, NEXUS (vol. 3, nos 4–5) published my first article, "Hormone Heresy", which challenged the medicalising and pathologising of women's hormonal health in the enthusiastic (and dangerous) prescribing of hormone replacement therapy and oral contraceptives. It is now a well-established fact that these drugs are harmful and have contributed to the health problems (and deaths) of women worldwide. I have continued to research, write and lecture about the many myths and misinformation regarding women's hormonal health in my ongoing pursuit of truthful information for hormonal well-being.

Our inescapable exposure to electropollution has many profound effects on our health. This article explores another important yet rarely understood consequence of electropollution: its ability to wreak havoc on the hormonal systems of women and men. As it turns out, electropollution is a very powerful hormone disruptor.

Our Wired and Wireless World

A defining moment in world history occurred in 1879 when Thomas Edison switched on the first light bulb. The flick of that switch radically transformed our world forever. The Age of Electricity was born. It is now impossible to imagine 21st-century life without this energy source, not to mention all of the technology and life-enhancing devices it has generated. However, even the genius of Edison could never have foreseen the global health challenges created from his discovery.

Power lines, transmitters, electrical wiring and appliances create both electric and magnetic fields—invisible lines of force that surround any electrical device. Our love affair with all things electrical means that we are now living in a dense sea of electromagnetic energy waves, called electromagnetic radiation (EMR), which are estimated to be 100 to 200 million times greater in prevalence than a hundred years ago.

Compounding the problem is the explosion of wireless technology such as cellphones (mobile phones), Bluetooth, PDAs (personal digital assistants), Wireless Internet, WiFi (wireless fidelity, which allows for Internet access in airports, hotels, coffee shops and schools, etc.) and powerful microwave-emitting towers that are required for transmission. This pervasive wireless world emits a particular spectrum of electromagnetic radiation that has its own damaging effects on living systems.

Within just two decades, wireless technology has exploded onto the global scene. Currently there are more than 236 million cellphones in the USA, 20 million in Canada and 19 million in Australia. In addition, millions of cellphone towers have appeared in the landscape around the world and thousands of communities either have WiFi or are considering implementing it. The Wi-Fi hot-spot phenomenon is expected to burgeon from 12,400 locations in the USA and Canada by the end of 2007 to 78,000 by 2008.

In just 25 years, the great majority of the human race has been exposed to a massive amount of electromagnetic radiation. Our homeostasis is now being thrown into turmoil by unprecedented levels of all forms of EMR, seriously compromising our body's ability to function properly.

What You Can't See Can Still Hurt You

A growing body of scientific research acknowledges that, presently, the greatest threat to our health and well-being (and to that of all life-forms) is an insidious, all-pervasive and invisible form of pollution called "electropollution". Many health issues have been linked to EMR exposure, including various cancers (especially brain, eye, ear and leukaemia),^{1,2}

miscarriages,³ birth defects,⁴ chronic fatigue syndrome,⁵ headaches,⁶ chronic stress,⁷ nausea and heart problems,⁸ autism,⁹ learning disabilities,¹⁰ insomnia and Alzheimer's disease.¹¹

Whatever your thoughts may be about living in this high-tech world, this technology poses serious health threats to us all. Robert Becker, MD—author of *Cross Currents: The Perils of Electropollution*,¹² medical researcher, expert on electromagnetic radiation and twice Nobel Prize nominee—is very concerned about electropollution: "I have no doubt in my mind that at the present time, the greatest polluting element in the earth's environment is the proliferation of electromagnetic fields. I consider that to be far greater, on a global scale than warming...and the increase in chemical elements in the environment."¹³

Anatomy of Electropollution 101

The 100 trillion cells of the human body communicate with each other via subtle, low-frequency electromagnetic signals as well as through biochemical reactions. These signal pathways carry the information that becomes translated into all the biochemical and physiological processes of the body. Continuous exposure to electromagnetic radiation can drastically distort and disrupt these cellular communication pathways, resulting in abnormal cellular metabolism and, ultimately, disease.

Electropollution-induced biological stress profoundly compromises normal physiology and intercellular communication. Imagine the chaos that results when communication systems go down in a city. In the body, on a cellular level, a similar chaos is created when normal processes shut down and intercellular communication is disrupted. Cell function deteriorates, cell membranes harden, nutrients can't get in and toxins can't get out. The breakdown of healthy cellular processes leads to biological chaos in our bodies.

Hundreds of studies have shown the harmful effects of EMR on the immune system,¹⁴ enzyme synthesis,¹⁵ the nervous system,¹⁶ learning, moods and behavioural patterns.¹⁷ All aspects of life at the molecular, cellular, biochemical and physiological levels can potentially be damaged by EMR exposure.

EMR, Melatonin Suppression and Cancer

Hormones are powerful substances. They pack a big wallop, considering the tiny amounts that are produced by the endocrine glands. Most hormones, such as oestrogen, progesterone, testosterone, insulin and melatonin, are made in parts per billion or parts per trillion. Even small hormonal fluctuations can create major physiological changes. As profound orchestrators of all of life's processes, maintaining hormonal balance is imperative for optimum health. When delicate hormonal balance and rhythms are altered, the body's ability to regulate fundamental systems goes haywire.

Our modern lifestyle poses many threats to optimal endocrine function. Stress, toxicity, poor-quality food, sleep deprivation and pharmaceutical medications are all known hormone disruptors.

However, there is one particular kind of hormone disruptor that has been seriously overlooked: electromagnetic radiation.

Perhaps one of the most serious consequences of EMR exposure is its effect on our hormonal systems. Embedded deep within the brain is a light-sensitive endocrine gland, the pineal gland, which is about the size of a pea. Since ancient times, the pineal gland has been associated with the mystical all-seeing "third eye". Once dismissed as a useless gland, the pineal, which in fact is a light-sensitive organ, is now considered to be one of the most significant glands in the body.

The pineal gland is the primary source of the hormone melatonin. Discovered 50 years ago, melatonin is now hailed as a miraculous hormone, regulating many key functions of human growth and health and providing powerful anticancer protection. Melatonin is produced about 90 minutes after one falls asleep.

Studies have shown that blood concentrations of the hormone rise after dark from low daytime values and usually peak in the middle of the night. Because the pineal gland responds to signals transmitted by the optic nerves, bombarding a person's eyes with bright light during the night can erase the usual nocturnal melatonin surge and lower the overall melatonin production for the day. Artificial light during sleep has a far more significant depressive effect than natural light.

Researchers are increasingly surprised at the extent of the physiological processes that are either controlled or influenced by melatonin. It regulates our circadian rhythms governing our waking/sleeping cycle and is one of the most efficient destroyers of free radicals, thereby ensuring that DNA synthesis and cell division occur. Melatonin not only inhibits the release of oestrogen but also actually suppresses the development of breast cancer.¹⁸

Melatonin's other anticancer property is its ability to increase the cytotoxicity of the immune system's killer lymphocytes. It is even able to enhance the immune system and counteract stress-induced immunosuppression.

Melatonin's breast cancer fighting ability also addresses two other threats that can increase cell division in the breast: the hormone prolactin, and the hormone known as "epidermal growth factor".

Melatonin also enhances the tumour-fighting power of vitamin D and increases this vitamin's ability to stop tumour growth. In fact, it makes vitamin D's tumour-fighting ability 20 to 100 times stronger. In addition, melatonin acts as an aromatase inhibitor, a powerful protection against oestrogen-dependent cancers.¹⁹

Needless to say, it is vital to ensure the body's ability to produce regular and adequate levels of melatonin on a daily basis. Unfortunately, sleeping in a room surrounded by all our favourite devices—cordless phone, cellphone, digital clock, CD/radio player, computer and TV—can seriously suppress our nightly melatonin production. Suppression of melatonin by the pineal gland has been suggested as a pathway for EMR's deleterious effects on health.

In 2001, Dr Masami Ishido and colleagues at Japan's National Institute for Environmental Studies showed that breast cancer cells treated with melatonin would resume growing when exposed

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to power-frequency EMR.²⁰ They found that magnetic fields disrupted the cells' signalling system—their internal communications network, which determines how they respond to their environment. In the process, Dr Ishido et al. also challenged one of the central tenets of mainstream toxicology: less is better and more is worse. The EMR effect he observed at 12 milligauss (mG) was pretty much the same as the one he saw when he used *a field 100 times higher*—at one gauss (1 G). Dr Ishido found indications that the effect was even stronger at the lower EMR dose than the higher one.²¹ This mechanism has helped to explain why reduced melatonin levels from EMR have been shown to cause a number of cancers including breast, prostate, colorectal, melanoma, ovarian malignancies and childhood leukaemia.

It is now known that melatonin suppression occurs at frequencies not far above those of the common household ranges of 50 hertz (Hz) (e.g., in Australia) and 60 hertz (e.g., in USA). If you sleep next to a cordless phone base station and/or digital clock or have faulty electrical wiring, there'll be enough continuous EMR exposure to suppress night-time melatonin production.

The connection between breast cancer and EMR continues to strengthen. Dr Patricia Coogan and colleagues at the Boston University of Public Health reported a 43 per cent increased risk in women with a high likelihood of occupational exposure to magnetic fields, such as those given off by mainframe computers.²²

In fact, women who work in electrical jobs, including electricians, telephone installers, power line workers and electrical engineers have been shown to have a greater risk of dying from breast cancer. This increased incidence has been directly linked to the suppression of melatonin by EMR.

And it's not just women who should be concerned about EMR's causal link to breast cancer. In five studies, elevated EMR has been implicated in an increased incidence of male breast cancer. Men who worked as telephone linemen, in switching stations and in the utilities industry were found to have as much as a sixfold increase in breast cancer compared with the general male population.²³

More Hormone Disruption from EMR

Experimental physiologist Dr Charles Graham found that magnetic fields have an effect on two other hormones. Overnight exposure of women to elevated levels of EMR in the laboratory significantly increased their level of oestrogen, which is a known risk factor for breast cancer.²⁴ In men, EMR exposure reduced the level of testosterone—a hormone drop that has been linked to testicular and prostate cancers.²⁵

Dr Graham notes that a field's steady magnitude matters less than its intermittency or other features, such as power surges called "electrical transients". These surges can pack a big burst of energy into a short period of time. They occur whenever lights or other electric devices are turned on, when motors or compressors (such as those in refrigerators and air conditioners) cycle on, or when dimmer switches are operated. Transients are hard to avoid because they may stem from surges elsewhere—in a neighbour's house or even in power lines up the street. Dr Graham also believes that EMR may actually fit the definition of an endocrine

disruptor better than many hormone-mimicking environmental pollutants because magnetic fields appear to elicit their effects by acting *on and through* hormones rather than *as* hormones.

Millions of women around the world are prescribed tamoxifen, the most popular drug given to prevent recurrence of breast cancer. A very significant study showed that tamoxifen lost its ability to halt the proliferation of cancer cells when exposed to EMR.²⁶ The level of EMR which produced this effect—12 mG or more—is found in common sources such as hairdryers, vacuum cleaners, can openers, computers, microwave ovens, desk lamps, blenders and electric clocks. What was even more troubling from further research was that while melatonin successfully reduced the growth rate of human breast cancer in a culture, when exposed to a 12 mG magnetic field it completely lost its ability to inhibit breast cancer cell growth.²⁷

Women who are being treated for breast cancer with tamoxifen are rarely, if ever, advised to reduce exposure to EMR or to use adequate technologies to protect themselves from EMR exposure.

Neurotransmitters, a special class of hormones which includes serotonin and dopamine, play a major role in moods. Changes in serotonin levels are known to be associated with depression. For example, lowered levels of this chemical in the brain have been linked to an increase in suicide frequency.²⁸ One study examined the brain functions of monkeys exposed to 60 Hz magnetic fields. It was found that the levels of serotonin and dopamine (the latter affecting brain processes that control movement, emotional response and ability to experience pleasure and pain) were significantly depressed immediately following exposure, and that only the dopamine returned to normal level several months afterwards.²⁹

Dr Becker reports: "It seems that there may be two types of clinical depression: one that is produced by simple psychosocial factors, and one that is produced by some external factor that influences the production of these psychoactive chemicals by the pineal gland. In view of the known relationship between the pineal gland and magnetic fields, it is advisable that the search for the responsible factor include an evaluation of the effect of abnormal electromagnetic fields."³⁰ He is backed up in his advice by other researchers.^{31, 32}

Stress Hormones and EMR

Exposure to high levels of EMR also increases the level of adrenalin, the flight or fight hormone, released from the adrenal glands. B. Blake Levitt, author of *Electrical Fields*, states: "Prolonged chronic stress is detrimental to every anatomical system, including the reproductive one. Subliminal stress may affect fertility and elevate blood pressure, which can lead to heart disease and stroke, as well as suppress immune function ... even short EMR exposures, like the use of a cordless phone on and off throughout the day, could cause spikes in such hormone levels."³³

The other stress hormone is cortisol, which affects long-term stress response. Also produced by the adrenals, cortisol is involved in glucose metabolism, blood pressure regulation, insulin release, inflammatory response, hormone balance and immune system function. The cortisol level also influences energy and memory. It should come as no surprise that EMR exposure has been found to cause increased serum cortisol.^{34, 35}

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Cellphones and Near Field Radiation

We now know that a very dangerous and specific form of EMR affecting the functioning of the brain and body is the information-carrying signal that is emitted from the cellphone's antenna, known as a "near-field plume". (Note that in newer cellphones, the antenna may be hidden and not be visible to the user; nonetheless, the near-field radiation is still a health issue.) The near-field radiation emanates outwards about 6–7 inches [approx. 15–18 centimetres] from the antenna in all directions. It is the result of a burst of power required to carry a radio signal to a base station that may be many kilometres away. Whenever we activate the phone to send or receive, whether it is held against the head, clipped to a belt or kept in a pocket, we are being exposed to dangerous information-carrying waves in the near field radiation plume.

The latest research shows that background radiation from the many EMR-emitting electrical appliances as well as the new wireless hot-spots equals the density of the information-carrying waves emitted from the near field. This means that there is danger not only close to the cellphone antenna, but also now in the general environment to which we are exposed every day.³⁶

Although the wireless technology industry and some governmental agencies continue to assure the public of the safety of cellphones (in a way that is very reminiscent of the tobacco industry), the truth is that recent scientific evidence has revealed an emerging pattern of severe health problems caused from exposure to near-field radiation. Cellphones are anything but safe and harmless. Some of the specific biological problems include disruption to the blood-brain barrier, genetic damage, breakdown in cell-to-cell communication and increase in the risk of cancers.³⁷ The

blood-brain barrier is a special filter in the blood vessels of the brain that keeps dangerous chemicals from reaching sensitive brain tissue and causing DNA to break. Near-field radiation is able to open up the blood-brain barrier, allowing damaging toxic chemicals a free ride into the brain tissue.

Near-field radiation also contributes to DNA damage. Many studies have found micronuclei (fragments of DNA with a surrounding membrane and with no physiological purpose) in the blood of people who use cellphones. Micronuclei result from a breakdown of the cell's ability to repair itself, and they indicate genetic damage. If the brain cells become unable to repair themselves, then tumours could develop.³⁸ More troubling is the fact that the presence of micronuclei can also indicate other health issues, e.g., compromised immunity, sleep disturbances, attention deficient disorders, autism and Alzheimer's disease. Since the body's master glands (pituitary, hypothalamus, pineal) are located within the brain, massive disturbances to the hormonal signalling capacities may potentially be generated from continual cellphone use.

Then there's the electrical circuitry from cellphones, which generates a competing energy that interferes with one's own biofield, or energy field. This kind of pervasive, or ambient, EMR compromises many physiological processes. When a cellphone is clipped onto the belt or kept in a pant pocket, this ambient field most powerfully affects the tissues and organs that it is closest to, particularly in the pelvic area. Two studies have

already shown a 30 per cent reduction in sperm count in male mobile phone users. As more women clip their cellphone to their belt, female reproductive organs may also be at risk.^{39,40}

A word of caution also needs to be mentioned about the dangers caused by ambient radiation from headsets. It is now acknowledged that headsets, far from being protective, can actually increase radiation emissions into the brain by as much as 300 per cent. Bluetooth technology is especially dangerous. The only safe headset to use is a hollow air-tube headset.

Cellphones, Cell Membranes and Carrier Waves

In recent years, exposure to radio frequencies emitted from cellphones and wireless communication devices has taken centre stage, implicated as causing serious physiological damage to cells.

Initially the wireless technology industry and the US government did not consider radio frequencies from cellphones to be a health risk. Despite massive evidence to the contrary, the industry still maintains that position. In the early days of this technology, it was believed that only a thermal effect, the heating of tissues (such as what occurs in a microwave oven), resulted in damage to tissues. Since cellphones do not have enough power to

heat tissue, the US government did not require any studies to be done to investigate the potential health problems.

However, emerging science has discovered that the problem with cellphones does not come from power output (thermal effect) but rather from the information piggybacking on the so-called "carrier wave" emitted from and received by the cellphone's antenna. This is called an "information-carrying radio wave" (ICRW). It is a frequency that conveys specific packets of information, allowing the transmission

of various features of cellphones, e.g., voice, text, graphics, etc.⁴¹ Herein lies the problem: this ICRW has a frequency that has never before existed in nature; our cells are totally unfamiliar with it and perceive it as a dangerous foreign invader.

The latest research has clearly identified the biological mechanisms of harm caused by ICRWs. We have special receptor sites, called "microtubules", on our cell membranes which can sense frequencies. The receptor sites interpret the ICRW as an unknown, threatening energy. Instantaneously the cell membrane will go into a protective lock-down mode. This means that nutrients cannot get into the cell and toxins and waste products cannot get out. It also means that vital cell-to-cell communication is lost.⁴² This effect is immediate and lasts for as long as a person is exposed to the ICRWs. The longer this condition persists, biological damage occurs—often resulting in free radical damage, genetic mutation, loss of cellular energy, premature ageing and, ultimately, degenerative disease.

If anyone should know about the harmful effects of cellphones and wireless technology, it is George Carlo, MD, PhD, author of *Cell Phones: Invisible Hazards in the Wireless Age*. A respected medical professor of epidemiology, Dr Carlo was hired by the Cellular Telecommunications Industry Association (CTIA) as the chief research scientist to lead a 28-million-dollar, five-year research program investigating the potential harmful effects of cellphones. The CTIA was confident that no health effects would be found. However, Dr Carlo and his team of 200 research

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scientists found otherwise. Upon presentation to the CTIA of his findings, he was summarily fired and the damning results were shelved. Dr Carlo has gone on to become one of the most reputable and vocal critics of the wireless technology industry and one of the world's leading experts on electropollution. According to Dr Carlo: "We understand that these information-carrying radio waves trigger protein membrane responses at the cell membrane level, leading to disruption of intercellular communication and build-up of free radicals inside the cell. This mechanism understanding is very important because it now explains the wide diversity of symptoms that we are seeing in patients who are reporting electrohypersensitivity and also other conditions such as headaches and unexplained anxiety that henceforth...we'll know will be associated with these information-carrying radio waves."⁴³

Imagine what happens to the functioning of a cell if it can't receive vital nutrients, eliminate waste products or communicate properly with other cells: complete havoc on a cellular level!

Since we are surrounded by cellphone towers and users, it has become virtually impossible to escape continuous and unrelenting exposure to ICRWs and ongoing harm to our physiological processes.

Increasing Risks from Wireless Technology

The Mobile Telephone Health Concerns

Registry is a non-profit organisation created to gather information about health effects from cellphones.⁴⁴ Previously, complaints were about health problems caused by cellphones. In the past two years, however, most complaints have to do with ambient (background) information-carrying radio waves coming from a vast variety of wireless sources. The strength of these ambient ICRWs is approaching the intensity of the radio frequencies emitted by cellphones.

What does this mean? It means that whether or not you choose to have a cellphone/mobile phone, the proliferation of wireless technology is exposing you and your children to dangerous radiation that instantaneously damages your cells and alters all physiological processes. There is nowhere to hide any more.

Dr Carlo has profound insight into the unprecedented public health disaster brewing from an increasingly wireless world. "Scientific studies continue to accumulate showing that information-carrying radio waves from mobile phones and other wireless devices, now used by more than three billion people worldwide, are dangerous. The mobile phone industry has not addressed the problem; governments around the world continue to be burdened by entanglements with the industry that render them unable to protect consumers. Emerging science shows links to conditions ranging from learning and spectrum disorders to cancer. If unabated, the brunt of the disease burden will continue to be borne by our children and grandchildren."⁴⁵

The bad news is that we face an unprecedented public health disaster. The good news is that there are some effective, scientifically validated, preventive interventions now available.

Three Pieces of the Intervention Puzzle

Resolving the electropollution problem necessitates addressing three distinct interventions: primary, secondary and tertiary. Dr Carlo is adamant that all three levels of intervention are required to ensure adequate protection against electropollution. He refers to this as the Public Health Paradigm.

Primary intervention technologies are those that act to prevent the cell membrane's protective response from being inappropriately triggered. These act on the "cause" of the problems and include appropriate headsets, active noise-field technologies (developed by the US military) and passive noise-field technologies.

Secondary intervention technologies are those that act to restore intercellular communication and thus can ameliorate the "effects" of EMR exposure. These are most effective in conjunction with primary interventions, and include subtle energy technologies, diodes and some pendants.

Tertiary intervention technologies are those that act to rehabilitate and correct cell damage. These work only in conjunction with primary and secondary intervention technologies, and include nutritionals, antioxidants and repair supplements.

To ensure the greatest protection, all three "layers" must be initiated simultaneously: to protect the cells from direct harm, to re-establish healthy cell-to-cell communication and to provide the body with the essential nourishment so it can repair itself and stay healthy.

On the subject of these three levels of intervention, Dr Carlo says: "The combined effect of electropollution covering all three effect windows is the most serious health risk we have ever faced because it is an overlay health risk that is now working insidiously in our lives. These exposures compromise fundamental biological processes including immune response and other physiological compensation systems. Thus, electropollution makes the

population more susceptible and vulnerable to other environmental insults such as air and water pollution, poor nutrition, exposures to viruses and bacteria, as well as physical stressors such as extreme heat or cold and stressful life events."⁴⁶

As we rush headlong into our exciting high-tech world, we must also understand that we are all participating in a massive experiment. Electropollution is a very real threat to present and future generations. Effective interventions are not a luxury but simply a necessity. Like it or not, the ever-expanding and intrusive electromagnetic world is here to stay. The responsibility lies with each one of us to take the proactive steps that will protect us, our family and future generations.

About the Author:

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Breast Cancer (GetWell International, 2003). She has contributed numerous articles to NEXUS, most recently "Drugs and Chemicals Straight from the Tap" in 12/03.

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Postscript: My Personal Choice for Protection against Electropollution

Four years ago, when I began investigating the effects of electropollution, I realised that it was becoming more and more difficult to avoid its pervasive health consequences. With the unparalleled explosion of EMR, it is now virtually impossible to escape the reach of the wireless world—whether you use a cellphone/mobile phone or not.

In light of this reality, I investigated the most scientifically supported forms of protection available. Few products actually demonstrated results. However, one company, BIOPRO Technology, has provided the science that proves the efficacy of their novel technologies (<http://www.bioprotechnology.com>).

They have licensed two technologies that are married in their phone chips and "Universal" chips for appliances, e.g., computers, wireless routers, etc.

The first technology is a patented passive noise field technology, called Molecular Resonant Effect Technology (MRET), which successfully addresses primary intervention, immediately stopping damage to cell membranes.

The other is a subtle energy technology, Energy Resonance Technology (ERT), which improves cell-to-cell communication, i.e., a secondary intervention.

While in the past I have always chosen to remain impartial with product recommendations, in this case the problem of electropollution is so serious that I felt it was imperative to recommend a proven technology. Visit the website <http://www.bioenergeticsinstitute.com> for the studies.

I not only recommend these products, but also make them available for purchase. If you would like more information, please visit the website <http://www.mybiopro.com/yes> or email me at golight@earthlink.net. In Australia, you can call (03) 9808 1822.

— Sherrill Sellman

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